

## Resistance to Electrolysis

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purpose, if a little nitric acid were added to the liquid in the *retarding* cells, then the transmission of the current was very much facilitated. For instance, in the experiment with one pair of exciting plates and one intervening plate (747), fig. 52, when a few drops of nitric acid were added to the contents of cell ii, then the current of electricity passed with considerable strength (though it soon fell from other causes (772, 776)), and the same increased effect was produced by the nitric acid when many interposed plates were used.

757. This seems to be a consequence of the diminution of the difficulty of decomposing water when its hydrogen, instead of being absolutely expelled, as in the former cases, is transferred to the oxygen of the nitric acid, producing a secondary result at the *cathode* (487); for in accordance with the chemical views of the electric current and its action already advanced (648), the water, instead of opposing a resistance to decomposition equal to the full amount of the force of mutual attraction between its oxygen and hydrogen, has that force counteracted in part, and therefore diminished by the attraction of the hydrogen at the *cathode* for the oxygen of the nitric acid which surrounds it, and with which it ultimately combines instead of being evolved in its free state.

758. When a little nitric acid was put into the exciting cells, then again the circumstances favouring the transmission of the current were strengthened, for the *intensity* of the current itself was increased by the addition (641). When therefore a little nitric acid was added to both the *exciting* and the *retarding* cells, the current of electricity passed with very considerable freedom.

759. When dilute muriatic acid was used, it produced and transmitted a current more easily than pure dilute sulphuric acid, but not so readily as dilute nitric acid. As muriatic acid appears to be decomposed more freely than water (500), and as the affinity of zinc for chlorine is very powerful, it might be expected to produce a current more intense than that from, the use of dilute sulphuric acid; and also to transmit it more freely by undergoing decomposition at a lower intensity (647).

760. In relation to the effect of these

interpositions, it is  
necessary to state that they do not appear to be at  
all dependent  
upon the size of the electrodes, or their  
distance from each  
other in the acid, except that when a current *can* -  
*pass*, changes  
in these facilitate or retard its passage. For on  
repeating the  
experiment with one intervening and one pair of  
exciting plates  
(747), fig. 52, and in place of the interposed plate  
P using some-